SOCIETY FOR THE TEACHING OF PSYCHOLOGY

Teaching of Psychology
38(2) 128-132

DOI: 10.1177/0098628311401586
http://top.sagepub.com
SAGE

Teaching the Evolution of the Mind: Current Findings, Trends, and Controversies in Evolutionary Psychology

James R. Liddle[1] and Todd K. Shackelford[2]

Abstract

As the burgeoning field of evolutionary psychology continues to gain exposure and acceptance throughout the psychological community, it is important to explain this field clearly and accurately to students. This article discusses some recent findings and trends in evolutionary psychological research to aid instructors in their efforts to provide students with an accurate view of what evolutionary psychologists do. It also discusses briefly some of the controversies related to evolutionary psychology and how to approach these issues in the classroom. Finally, it addresses some of the difficulties associated with teaching evolutionary psychology and offers strategies for effectively teaching the basic tenets of the field.

Keywords

evolution, evolutionary psychology, teaching

Current Findings and Trends

One of the primary areas of study in evolutionary psychology is mating, with particular focus on sex differences in mating psychology and behavior (see Buss, 2003). Indeed, mating is among the most commonly presented topics of evolutionary psychological research in introductory psychology textbooks (Cornwell, Palmer, Guinther, & Davis, 2005), and it continues to be one of the most common topics of research published in *Evolution and Human Behavior*, a flagship journal for the field (Webster, Jonason, & Orozco, 2010).

Recent research on mating has addressed, among other topics, human mate copying, a strategy of mate selection that also occurs in other species and entails basing one's mating decisions on the observed mating decisions of others of the same sex (Dugatkin, 1992). Investigations on the role of psychological adaptation in mate copying have produced mixed results (see Place, Todd, Penke, & Asendorpf, 2010). Place et al. (2010) recently argued that these mixed results are due to researchers' use of methods that lack ecological validity. In response to this concern, Place et al. studied mate copying by exposing participants to videotapes of speed dates, which, when compared to viewing photographs, may provide a more realistic opportunity to gauge the mating decisions of others. Place et al. found that men and women varied their interest in potential mates based on the expressed interest of the same-sex individual in the video. They also found that the degree of mate copying by men depended on their self-perceived attractiveness relative to the man in the video. Because these preferences occurred reliably and without conscious awareness, one might conclude that psychological adaptation produces mate copying in humans. Nevertheless, additional research is necessary to determine whether the features needed to posit adaptation are present (i.e., complexity, economy, efficiency, reliability, precision, and functionality; see Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998).

Another example of current research on mating psychology tests the hypothesis that men are sensitive to and attracted to cues of fertility in women. This is because reproductive value (i.e., expected future reproduction; Trivers, 1972) is not as constant in adulthood for women as it is for men. Women experience sharp declines in reproductive value with increasing age and are at peak reproductive value in the late teens, which is why men, on average, find youth more important in potential long-term mates than do women (Buss, 2003; Etcoff, 1999). Another cue of female reproductive value is waist-to-hip ratio (WHR). A lower WHR indicates good health, an increased likelihood of pregnancy, and an optimal level of sex hormones (Singh, Dixson, Jessop, Morgan, & Dixson, 2010). As predicted by an evolutionarily informed hypothesis, men find women with lower WHR more sexually attractive (Singh, 1993). Although critics of evolutionary psychology might argue that preferences for lower WHR depend on how Western industrialized culture and the mass media define "attractive," recent research documents that

[1] Florida Atlantic University, Davie, FL
[2] Oakland University, Rochester, MI

Corresponding Author:
James R. Liddle, Florida Atlantic University, Department of Psychology, ES 249B, 3200 College Avenue, Davie, FL 33314
Email: jliddle1@fau.edu

Fig 1a. Liddle **Fig 2b.** Shackelford

the preference for women with lower WHR is present across cultures (Singh et al., 2010) and also in congenitally blind men whose preferences cannot depend on visual media (Karremans, Frankenhuis, & Arons, 2010).

Despite these and other recent findings on the topic of mating psychology, teachers should not give students the false impression that mating is the only topic about which evolutionary psychologists are interested. Another seminal topic in evolutionary psychology that has seen tremendous growth over recent years is morality (see Krebs, 2005). Much of the evolutionary psychological research on morality has focused on the factors that influence cooperation between individuals and altruism toward others. Three core ideas within the evolutionary sciences inspire this research: kin selection (Hamilton, 1964), which explains altruistic behavior among relatives as a function of benefitting shared genes; reciprocal altruism (Trivers, 1971), which explains altruistic behavior between genetically unrelated individuals as a function of anticipating one's altruistic acts to be reciprocated in the future by the beneficiary (i.e., "You scratch my back, and I'll scratch yours"); and indirect reciprocity (Alexander, 1987), which explains how altruists can benefit without direct reciprocation because of boosts to their reputation and status in the community.

Recent research has demonstrated that, in addition to the degree of genetic relatedness, willingness to perform costly acts of altruism is influenced by whether the beneficiary is suffering from reproductive limitations, such as schizophrenia and other disorders that can decrease the probability of reproduction (Fitzgerald & Colarelli, 2009). This observation makes sense when one examines the underlying logic of kin selection. The reason that the costs of altruism are offset when helping genetic kin is that the altruist is benefitting someone with whom he or she shares genes. Thus, the beneficiary's reproductive success is a means by which the altruist can replicate copies of his or her genes. But if one's genetic kin cannot reproduce or is otherwise limited reproductively, the costs are not offset to the same degree, and one might thus expect altruistic behavior to decrease.

Researchers have also recently examined indirect reciprocity, specifically in terms of the likelihood of buying environmental "green" products. Griskevicius, Tybur, and Van den Bergh (2010) argued that going green represents a costly altruistic act because green products are often more costly and occasionally of lower quality than are non-green products. As predicted by Griskevicius et al., when participants had to choose between a green version of a product (e.g., a hybrid car) and a more luxurious but equally priced non-green version, participants primed cognitively with a story about status were more likely to choose a green product than those in the control group. The researchers also found that status priming increased the desire to buy green items when shopping in public but not in private, as well as when green items cost more than non-green items. These results support the hypothesis that the desire to earn a good reputation and status in the local community motivates some acts of altruism.

Another topic that has seen advancements in recent years is cultural difference. Some critics suggest that the existence of cultural differences undermines a basic tenet of evolutionary psychology: that certain psychological mechanisms are universal (Confer et al., 2010). But because behavior is the result of psychological mechanisms and is not hardwired, and because the output generated by these mechanisms depends in part on the environmental input received, different environments can lead to different behaviors, thus (partially) explaining cultural differences.

One environmental variable that has received recent attention is parasite prevalence. Humans have evolved mechanisms for avoiding pathogens, and the pathogen prevalence of an environment determines the degree to which these mechanisms are activated. Fincher, Thornhill, Murray, and Schaller (2008) documented a correlation between pathogen prevalence and a society's preferences for collectivism or individualism, with greater pathogen prevalence hypothesized to cause greater collectivism, presumably because collectivist attitudes (e.g., xenophobia) motivate behaviors that minimize exposure to novel pathogens. Related research indicates that greater pathogen prevalence predicts greater religious diversity (Fincher & Thornhill, 2008a) and language diversity (Fincher & Thornhill, 2008b) because pathogen avoidance behaviors like out-group avoidance and limited dispersal keep disparate cultures in an environment from merging. Most recently, researchers have revised this pathogen prevalence hypothesis to focus specifically on parasites transmitted from human to human (i.e., non-zoonotic). Thornhill, Fincher, Murray, and Schaller (2010) found that, as expected, the prevalence of non-zoonotic parasites (but not zoonotic, or nonhuman to human, parasites) predicted cultural differences in individualism and collectivism, gender equality, democratization, and personality traits such as unrestricted sociosexuality and extraversion.

These examples hardly scratch the surface of the diversity of topics investigated by evolutionary psychological research. Indeed, such variety illustrates that evolutionary psychology is an approach to psychology rather than a subdiscipline because all topics within psychology are open to evolutionary analysis. This means that even with the impressive strides in evolutionary psychological research that researchers have made over the past several decades, a staggering array of topics and questions remain open to investigation.

Controversies in Evolutionary Psychology

The majority of controversies surrounding evolutionary psychology come from individuals outside the field whose critiques often derive from, or are inspired by, fundamental misunderstandings. Students who are new to evolutionary psychology may have similar misunderstandings. For example, students may get the impression that evolutionary psychology endorses or assumes genetic determinism and that behaviors are hardwired. Therefore, it is important to clarify that evolutionary psychology does not pick sides on the nature-versus-nurture debate but instead posits a necessary interaction between genes and environments. More specifically, behavior is the result of psychological mechanisms that operate according to the type of input they receive, one of the most important sources of which is the environment.

Another common misunderstanding is that evolutionary psychology endorses and promotes behaviors that are selfish, coercive, sexist, misogynistic, and so on. In fact, evolutionary psychologists are interested in *explaining* human psychology and behaviors; explanations for behaviors such as infidelity (Greiling & Buss, 2000; Symons, 1979), rape (Thornhill & Palmer, 2000), and warfare (Smith, 2007) are not justifications for these behaviors. These examples represent but a fraction of the controversies surrounding evolutionary psychology. Interested readers can find a more detailed and thorough discussion of these and other controversies elsewhere (see Buss, 2004; Cartwright, 2001; Confer et al., 2010; Geher, 2006; Hagen, 2005; Kurzban, 2002; Liddle, Bush, & Shackelford, in press; Liddle & Shackelford, 2009; Sell, Hagen, Cosmides, & Tooby, 2003; Workman & Reader, 2008).

Teaching Evolutionary Psychology

Compared to teaching other topics or areas in psychology, teaching evolutionary psychology presents several unique challenges. Arguably the greatest challenge to teaching evolutionary psychology is that students must understand and accept as true the theory of evolution by natural selection. This is particularly problematic in the United States, where only 14% of the population accepts the idea of human evolution without supernatural intervention (Gallup, 2008). The situation improves somewhat within the college setting, but still only 53% of college graduates state that they believe in evolution (Gallup, 2009). This means that in a typical college class, roughly half of the students may ignore anything they learn about evolutionary psychology because it is founded on a theory they refuse to accept. In addition, of those students who do accept evolution, the majority probably lacks a clear understanding of how evolution works because their primary and secondary school teachers have taught evolution either poorly or not at all (Nadelson & Sinatra, 2009). Thus, approaching the topic of evolutionary psychology might require teachers to engage in substantial preparatory work.

Providing students with the information they need to accept evolution as established fact is prerequisite to teaching evolutionary psychology successfully. The extent to which teachers can accomplish this task depends in part on the course schedule and learning expectations, but even instructors of introductory psychology courses can find the time to explain the logic of evolution by natural selection. One of the strengths of the theory is the simplicity of its premises. As long as there is (a) variation among organisms, (b) heritability of these variations, and (c) these variations affect an organism's ability to survive and reproduce, evolution by natural selection will occur. Teachers can briefly describe each of these criteria so students can appreciate how they exist in the natural world. For example, genetics explains not only how variations can emerge (e.g., through genetic mutation and recombination of DNA) but that organisms can pass these variations to offspring with high fidelity. Also, it is important to clarify that no species can consist of organisms that are all successful at surviving and reproducing, because this would lead to an exponential increase in population that would eventually cover every inch of the planet. There are always some organisms that are successful and some that are not, and differential reproductive success causes certain heritable traits (i.e., the traits that contributed to success) to be selected over others.

When explaining the basics of the theory of evolution by natural selection, clarifying what one means by "theory" can address some of the confusions and reservations many students have when approaching this topic. Although in laymen's terms *theory* refers to a guess or a hunch, scientists use the term to refer to "a well-substantiated explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and tested hypotheses" (National Academy of Sciences, as cited in Scott, 2005, p. 14). A theory is the strongest product of science because it provides explanations, which facts cannot do. The fact of evolution is simply the observation that evolution occurs. Although it is important to realize that evolution is indeed a fact, this fact is less useful than is the theory of evolution by natural selection, which explains how and why evolution occurs. In other words, moving from theory to fact would constitute a demotion in scientific terms. Explaining this distinction will allow students to appreciate the absurdity of criticizing evolution as "just a theory." Students may also realize that referring to evolution as "just a fact" would constitute a more derogatory statement.

Teachers can increase the odds of students' accepting evolution by providing examples of the evolutionary process. One example that is particularly useful for combating skepticism about evolution is the evolution of the eye. Although at first glance the eye may seem to be a structure of "irreducible complexity" (Behe, 1996, p. 39), researchers have demonstrated that a complex eye can evolve gradually from a patch of light-sensitive cells through several intermediate steps, with each minute change providing a benefit over the previous design, in fewer than 400,000 generations (Nilsson & Pelger, 1994). Researchers have observed many of the posited intermediate steps in the fossil record and in extant species, which demonstrates that eyes of varying complexity do provide survival benefits (Coyne, 2009).

Regardless of how much time teachers spend explaining evolution and how much supporting evidence they provide, there will be some students who refuse to accept it. The refusal to accept evolution is strongly tied to religious beliefs (Alters & Alters, 2001), and those who deny evolution often feel that accepting evolution necessarily entails abandoning their religion. When students feel that they must choose between a strongly held belief system or worldview and a scientific theory to which they have no emotional attachment, they will sometimes side with the former. Therefore, one way to reach these students is to clarify that accepting evolution may not require them to abandon their religious beliefs. For example, teachers can point out that, although they represent a minority, there are prominent scientists who both accept evolution and are religious (e.g., Collins, 2006; Miller, 2007). Nevertheless, there are many religious beliefs that directly contradict evolutionary theory, and if one believes in the God of Abraham as literally interpreted from the Bible, then this belief cannot be reconciled with organisms evolving through natural selection over billions of years. A better approach may be to encourage students to think critically about the beliefs they hold. Teachers should make clear to students that no beliefs should be immune to critical scrutiny, whether religious or scientific. One should always be concerned with the evidence in support of (or in opposition to) a belief. Fostering this way of thinking may encourage previously dismissive students to consider the mountain of evidence in support of evolution.

Whether teachers spend several class periods or only a few minutes explaining evolutionary theory, the goal is to segue into evolutionary psychology. A good starting point is to acknowledge that the brain, like every other organ, has evolved through the slow, gradual process of natural selection. Evolutionary psychologists expand on this fact by positing that the brain is comprised of several information-processing mechanisms, each of which was selected to solve an adaptive problem that humans' ancestors faced recurrently over human evolutionary history (Tooby & Cosmides, 2005). These mechanisms are designed to register specific types of input (e.g., environmental stimuli, physiological activity, output from other psychological mechanisms) and to generate output that on average benefited humans' ancestors in solving adaptive problems such as finding food, finding a mate, retaining a mate, navigating the environment, and avoiding predators. Based on justifiable assumptions about the selection pressures that early humans faced, evolutionary psychologists generate hypotheses about what types of evolved psychological mechanisms exist and what types of output these mechanisms produce in today's world (i.e., a world that includes novel environmental and social input that did not exist when these mechanisms evolved). This is evolutionary psychology in a nutshell.

Conclusion

We hope the information provided here aids instructors in introducing evolutionary psychology to their students. This field may be more challenging to explain than other fields or topics in psychology because of its explicit reliance on evolutionary theory, a theory for which students often need clarification before they can appreciate the rationale behind evolutionary psychology. Fortunately, teachers can explain the basics of evolutionary theory in a relatively short time period, and when they couple this information with a presentation of the tenets of evolutionary psychology and examples of current research in the field, students can acquire a solid understanding of what evolutionary psychology is and what this approach to psychology has to offer.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

Financial Disclosure/Funding

The authors received no financial support for the research and/or authorship of this article.

References

Alexander, R. (1987). *The biology of moral systems: Foundations of human behavior.* New York, NY: Aldine de Gruyter.

Alters, B. J., & Alters, S. M. (2001). *Defending evolution: A guide to the creation/evolution controversy.* Sudbury, MA: Jones & Bartlett.

Behe, M. J. (1996). *Darwin's black box: The biochemical challenge to evolution.* New York, NY: Free Press.

Buss, D. M. (2003). *The evolution of desire: Strategies of human mating* (Rev. ed.). New York, NY: Basic Books.

Buss, D. M. (2004). *Evolutionary psychology: The new science of the mind* (2nd ed.). Boston, MA: Allyn & Bacon.

Buss, D. M., Haselton, M. G., Shackelford, T. K., Bleske, A. L., & Wakefield, J. C. (1998). Adaptations, exaptations, and spandrels. *American Psychologist*, *53*, 533-548.

Cartwright, J. (2001). *Evolution and human behavior.* Cambridge, MA: MIT Press.

Collins, F. S. (2006). *The language of God: A scientist presents evidence for belief.* New York, NY: Free Press.

Confer, J. C., Easton, J. A., Fleischman, D. S., Goetz, C. D., Lewis, D. M. G., Perilloux, C., . . . Buss, D. M. (2010). Evolutionary psychology: Controversies, questions, prospects, and limitations. *American Psychologist*, *65*, 110-126.

Cornwell, R. E., Palmer, C., Guinther, P. M., & Davis, H. P. (2005). Introductory psychology texts as a view of sociobiology/evolutionary psychology's role in psychology. *Evolutionary Psychology*, *3*, 355-374.

Coyne, J. A. (2009). *Why evolution is true.* New York, NY: Viking.

Dugatkin, L. A. (1992). Sexual selection and imitation: Females copy the mate choice of others. *American Naturalist*, *139*, 1384-1389.

Etcoff, N. (1999). *Survival of the prettiest: The science of beauty.* New York, NY: Random House.

Fincher, C. L., & Thornhill, R. (2008a). Assortative sociality, limited dispersal, infectious disease and the genesis of the global pattern of religion diversity. *Proceedings of the Royal Society, Series B*, *275*, 2587-2594.

Fincher, C. L., & Thornhill, R. (2008b). A parasite-driven wedge: Infectious diseases may explain language and other biodiversity. *Oikos*, *117*, 1289-1297.

Fincher, C. L., Thornhill, R., Murray, D. R., & Schaller, M. (2008). Pathogen prevalence predicts human cross-cultural variability in

individualism/collectivism. *Proceedings of the Royal Society, Series B*, *275*, 1279-1285.

Fitzgerald, C. J., & Colarelli, S. M. (2009). Altruism and reproductive limitations. *Evolutionary Psychology*, *7*, 234-252.

Gallup. (2008). *Evolution, creationism, intelligent design*. Retrieved September 10, 2010, from http://www.gallup.com/poll/21814/Evolution-Creationism-Intelligent-Design.aspx

Gallup. (2009). *On Darwin's birthday, only 4 in 10 believe in evolution*. Retrieved September 10, 2010, from http://www.gallup.com/poll/114544/Darwin-Birthday-Believe-Evolution.aspx

Geher, G. (2006). Evolutionary psychology is not evil! (. . . And here's why . . .). *Psychological Topics*, *15*, 181-202.

Greiling, H., & Buss, D. M. (2000). Women's sexual strategies: The hidden dimension of extra-pair mating. *Personality and Individual Differences*, *28*, 929-963.

Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, *98*, 392-404.

Hagen, E. H. (2005). Controversial issues in evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 145-173). Hoboken, NJ: John Wiley & Sons.

Hamilton, W. D. (1964). The genetical evolution of social behaviour, I and II. *Journal of Theoretical Biology*, *7*, 1-52.

Karremans, J. C., Frankenhuis, W. E., & Arons, S. (2010). Blind men prefer a low waist-to-hip ratio. *Evolution and Human Behavior*, *31*, 182-186.

Krebs, D. (2005). The evolution of morality. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 747-771). Hoboken, NJ: John Wiley & Sons.

Kurzban, R. (2002). Alas poor evolutionary psychology: Unfairly accused, unjustly condemned. *Human Nature Review*, *2*, 99-109.

Liddle, J. R., Bush, L. S., & Shackelford, T. K. (in press). An introduction to evolutionary psychology and its application to suicide terrorism. *Behavioral Sciences of Terrorism and Political Aggression*.

Liddle, J. R., & Shackelford, T. K. (2009). Why evolutionary psychology is "true." A review of Jerry Coyne, *Why Evolution Is True*. *Evolutionary Psychology*, *7*, 288-294.

Miller, K. R. (2007). *Finding Darwin's God: A scientist's search for common ground between God and evolution.* New York, NY: Harper Perennial.

Nadelson, L. S., & Sinatra, G. M. (2009). Educational professionals' knowledge and acceptance of evolution. *Evolutionary Psychology*, *7*, 490-516.

Nilsson, D. E., & Pelger, S. (1994). A pessimistic estimate of the time required for an eye to evolve. *Proceedings of the Royal Society of London, Series B*, *256*, 53-58.

Place, S. S., Todd, P. M., Penke, L., & Asendorpf, J. B. (2010). Humans show mate copying after observing real mate choices. *Evolution and Human Behavior*, *31*, 320-325.

Scott, E. C. (2005). *Evolution vs. creationism: An introduction.* Berkeley: University of California Press.

Sell, A., Hagen, E., Cosmides, L., & Tooby, J. (2003). Evolutionary psychology: Applications and criticisms. In *Encyclopedia of Cognitive Science* (pp. 47-53). London: Macmillan.

Singh, D. (1993). Adaptive significance of female physical attractiveness: Role of waist-to-hip ratio. *Journal of Personality and Social Psychology*, *65*, 292-307.

Singh, D., Dixson, B. J., Jessop, T. S., Morgan, B., & Dixson, A. F. (2010). Cross-cultural consensus for waist-hip ratio and women's attractiveness. *Evolution and Human Behavior*, *31*, 176-181.

Smith, D. L. (2007). *The most dangerous animal: Human nature and the origins of war.* New York, NY: St. Martin's.

Symons, D. (1979). *The evolution of human sexuality.* New York, NY: Oxford University Press.

Thornhill, R., Fincher, C. L., Murray, D. R., & Schaller, M. (2010). Zoonotic and non-zoonotic diseases in relation to human personality and societal values: Support for the parasite-stress model. *Evolutionary Psychology*, *8*, 151-169.

Thornhill, R., & Palmer, C. T. (2000). *A natural history of rape: Biological bases of sexual coercion.* Cambridge, MA: MIT Press.

Tooby, J., & Cosmides, L. (2005). Conceptual foundations of evolutionary psychology. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 5-67). Hoboken, NJ: John Wiley & Sons.

Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology*, *46*, 35-57.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man: 1871–1971* (pp. 136-179). Chicago, IL: Aldine.

Webster, G. D., Jonason, P. K., & Orozco, T. (2010). Hot topics and popular papers in evolutionary psychology: Analyses of title words and citation counts in *Evolution and Human Behavior*, 1979-2008. *Evolutionary Psychology*, *7*, 348-362.

Workman, L., & Reader, W. (2008). *Evolutionary psychology: An introduction* (2nd ed.). New York, NY: Cambridge University Press.

Bios

James R. Liddle (www.jamesrliddle.com) is a doctoral student in the evolutionary psychology PhD program at Florida Atlantic University. He is a member of Dr. David F. Bjorklund's evolutionary developmental psychology lab and is coadvised by Dr. Todd K. Shackelford at Oakland University. His research interests focus primarily on the origin and development of religious belief systems as well as superstitious beliefs. He is currently investigating the societal factors that influence religiosity.

Todd K. Shackelford received his PhD in evolutionary psychology in 1997 from the University of Texas–Austin, his MA in psychology from the University of Michigan in 1995, and his BA in psychology from the University of New Mexico in 1993. He is professor and chair of the Department of Psychology at Oakland University, where he is director of the evolutionary psychology lab (www.ToddKShackelford.com). He has published more than 200 peer-reviewed articles and chapters in edited volumes and has coedited six volumes. Much of Shackelford's research addresses sexual conflict between men and women, with a special focus on testing hypotheses derived from sperm competition theory. Since 2006, Shackelford has served as editor of *Evolutionary Psychology* (www.epjournal.net).